PATENT
6515-1003

IN THE U.S. PATENT AND TRADEMARK OFFICE

In re application of

Michael Windsor SYMONS Conf. 6057

Application No. 10/524,428 Group 1796

Filed February 15, 2005 Examiner J. Cooney

METHOD OF PRODUCING A HYDRAULIC BINDER
OR THERMOPLASTIC CONTAINING PRODUCT

DECLARATION

Assistant Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

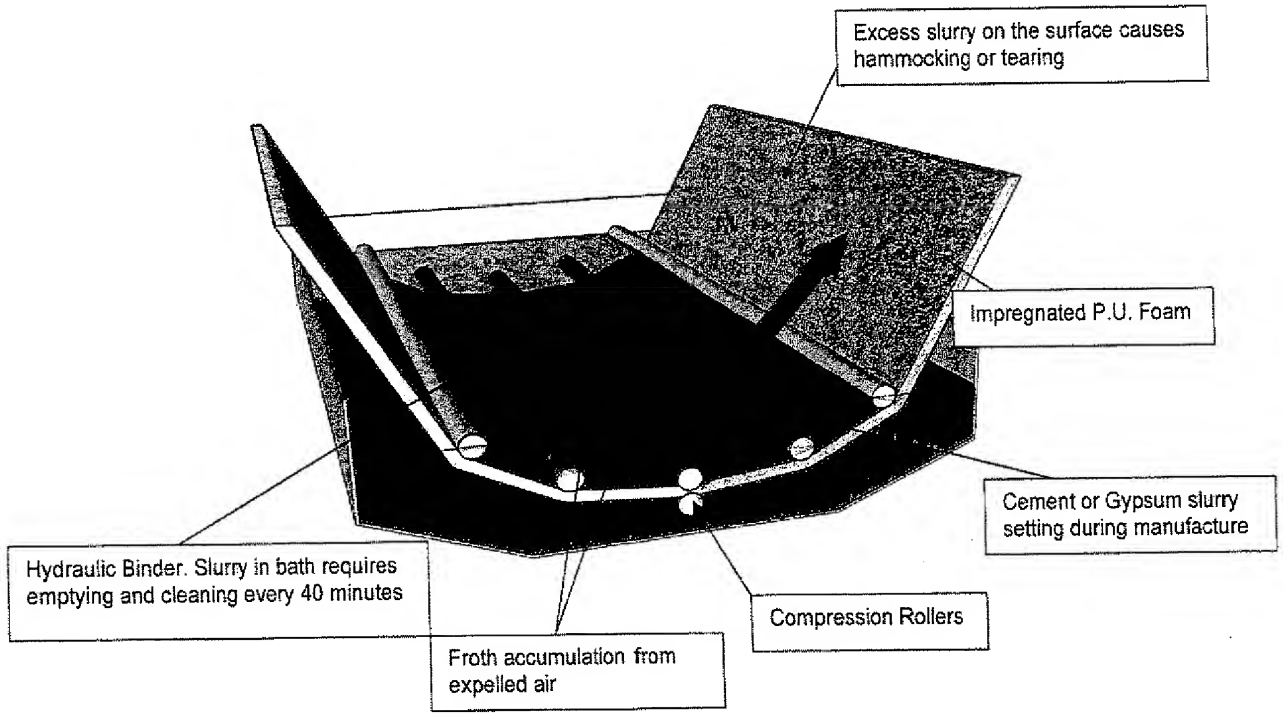
Sir:

1. I, Michael Windsor Symons, the named inventor, am a British citizen and reside at 16 Luipaard Road, Monument Park, Pretoria 0181 South Africa.

2. I am familiar with the above-identified U.S. patent application, its prosecution before the United States Patent and Trademark Office, and the applied references of KURZ et al. (U.S. Patent 3,451,842) and VAN OOST (U.S. Patent 5,931,595).

3. In order to demonstrate the patentability of the present invention, I am submitting the following observations.

The process of KURZ et al. has been attempted as is set forth in the diagram below.



The technology of KURZ et al. utilizes no mechanical or continuous feed mechanism, and thus uniformity of impregnation, control of dwell time and handling of the impregnated foam are not industrially applicable.

The process described in KURTZ et al. is simply not practical as:

i) As the foam is immersed in a slurry of gypsum or Portland cement in a bath the slurry proceeds to set by hydration within a limited period of time making the procedure unsatisfactory for industrialization.

ii) When the foam is submerged in the bath of slurry and is compressed, the slurry is aerated and froths to the point of being unsuitable for the purpose of continuously impregnating the foam.

iii) When the foam is compressed in the bath of slurry, the elimination of the air and the subsequent movement of the slurry to the centre of the compressed foam results in improper impregnation as the induced vacuum is insufficient.

iv) In order for the foam exiting the bath not to "hammock" with a slurry pool on the top surface, the foam must be inserted semi-vertically into the slurry pool and when the impregnated foam is withdrawn semi-vertically the weight thereof is excessive which results in tearing.

v) There is no control of the degree of impregnation and the mass of slurry contained in the impregnated foam when the foam is submerged and compressed in the pool of slurry.

Accordingly it is not possible to provide direct comparative data between a product produced through the method of KURTZ et al. and the method of the present invention.

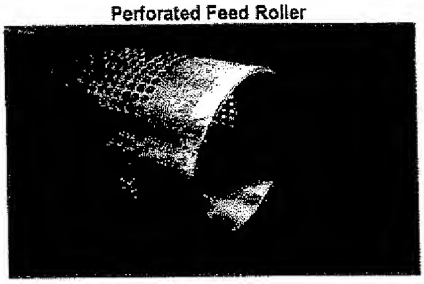
In contrast, the present invention utilizes perforated rollers, which are illustrated below.

POLYURETHANE FOAM INJECTOR

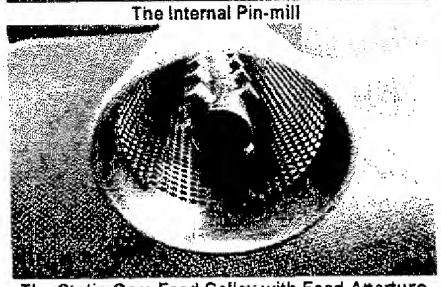
Built and used exactly in accordance with the method of the Invention.

Drive to Pin-mill

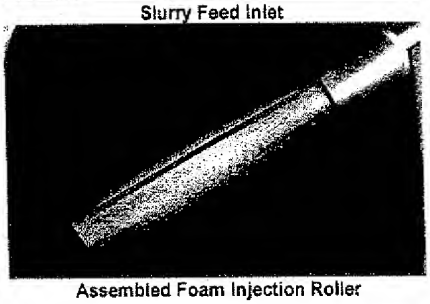
Perforated Feed Roller



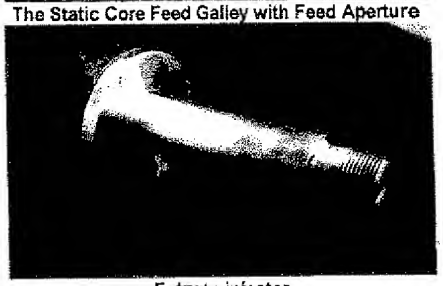
The Internal Pin-mill



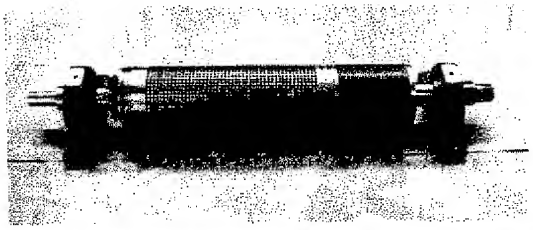
Slurry Feed Inlet



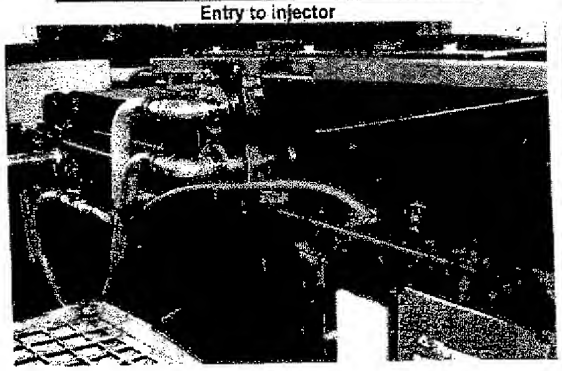
The Static Core Feed Galley with Feed Aperture



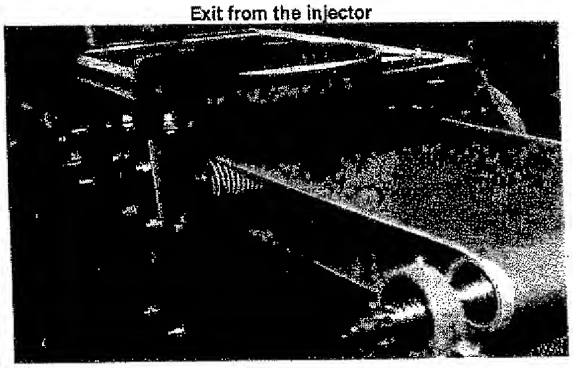
Assembled Foam Injection Roller



Entry to injector



Exit from the injector



Assembled operative P.U FOAM injector as per the invention. Note the two pipes conveying the pumped slurry into the inject roller feed galleys.

The advantages of the perforated rollers are as follows:

i) The rollers allow the feeding of the foam at a controlled speed.

ii) By controlling the hydraulic pressure of the slurry in the perforated rollers and the viscosity of the slurry the mass of slurry impregnated can be accurately controlled.

iii) After when the foam regains its original thickness after compression as a result of its memory, the impregnated foam serves as a carrier of the hydraulic binder slurry which can then be formed to a shape or pressed.

IV) When pressed the slurry migrates to the surfaces leaving a partially impregnated core thereby providing a stress skin composite of greater stiffness and which is more economic than a solid and which is easier to cut or work in practice.

V) After a production run the perforated rollers are easily purged and cleaned with water.

As an illustration of these benefits, attached is a report from Cermalab CC, an independent test laboratory, which has considerable experience in hydraulic binders and ceramics.

The report from Cermalab CC deals with two boards produced according to the method of claim 18 of the present invention. The first board was pressed and the second board was not pressed.

Also attached is a description of the different ways where the first and second boards were manufactured as well as photographs of the two boards. The first board has a density of 1.33 g/cm^3 and the second board has a density of 0.31 g/cm^3. Bend strength results show that the first board is significantly stronger than the second board.

The two photographs of the boards show the versatility of the process whether post-compressed or not. The point requiring emphasis is that the uncompressed form, intimate internal surface wetting of the foam is an important factor that requires uniform compression on a point and linear contact basis such as happens between the feed rollers thereby avoiding the lateral movement of slurry in the foam matrix, which results in variable density and in some places no impregnation at all.

Also attached to this paper are photographs of the polyurethane foam injector built and used exactly in accordance with the present invention.

Attachments:

Letter of May 5, 2008 by Michael Windsor Symons, including appended photographs of PU foam.

April 24, 2008 report of Cermalab CC.

Letter of August 20, 2008 by Michael Windsor Symons, including diagrams of the KURZ et al. technology and that of the present invention.

4. I declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under §1001 of Title 18 of the United States code and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

Date 8 Oct 2008

Michael Windsor Symons

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5 May 2008

PER FAX: 012 481 1601
012 362 1845
danie@adamsadams.co.za

Adams & Adams
PO Box 1014
Pretoria
0001

Dear Danie

Patent Number: **United States Patent Application 10/524,428**
Title of the Invention: **Method of Producing Binder or Thermoplastic Containing Product**
Your Reference: **P41643US00 DHD/nv**

I enclose with this letter photographs of two forms of PU foam impregnated with an hydraulic binder, in this case cement.

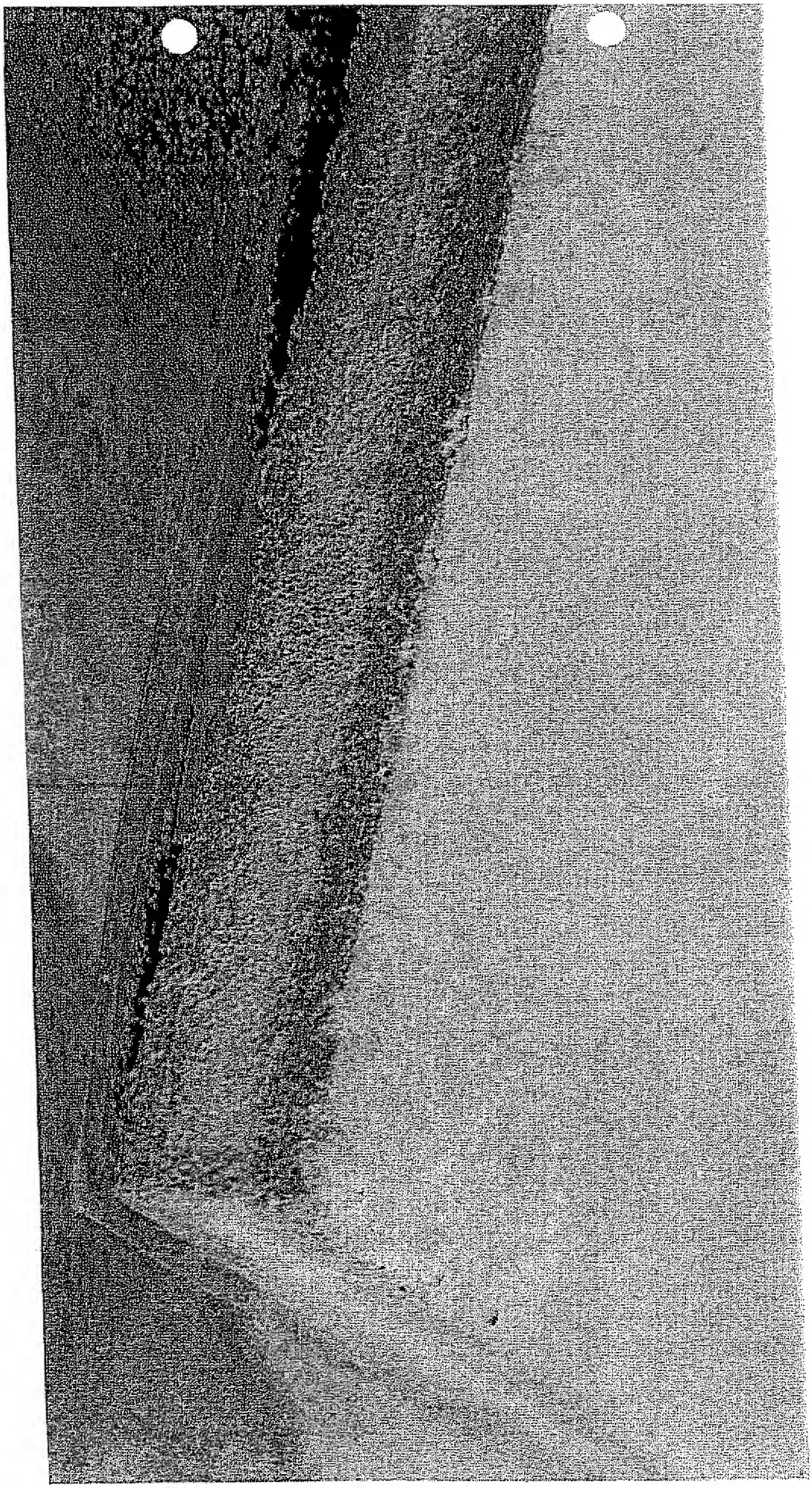
The one is at a density of 1.33g per litre and has as a modulus of rapture of a little over 11 mPa and ambient cured. This is at least equal or slightly higher than an autoclaved fibre cement board such as is made by Everite in this country and James Hardie in the United States. The reason for the strength is the two dense outer horizons giving added stiffness and is created by compression as provided for in Claim 18.

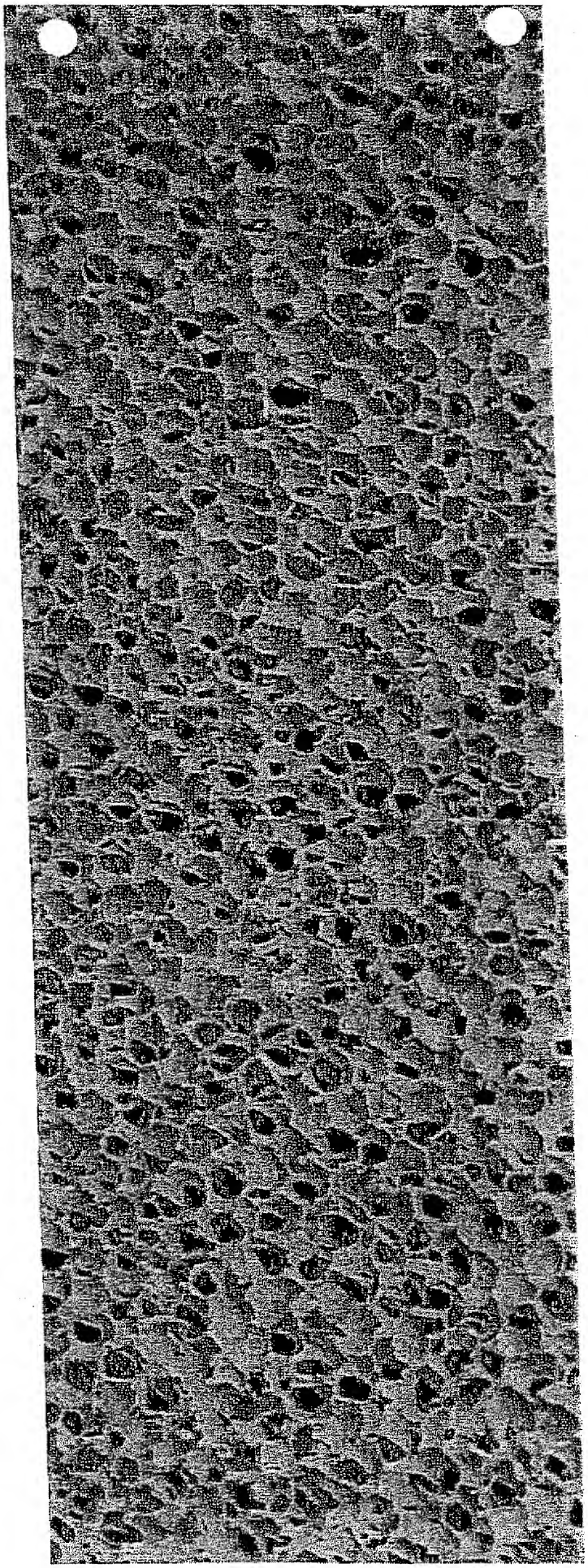
The second sample is uncompressed foam which is in the density range 300kg/m^3 to 600kg/m^3 when dry. This has good thermal insulation properties, cuts easily, is good acoustically and has applications such as the core of walls as against the faces of walls.

The two photographs show the versatility of the process whether post compressed or not. The point requiring emphasis is that in the uncompressed form, intimate internal surface wetting of the foam is an essential which requires uniform compression on a point contact basis such as happens between the feed rollers thereby avoiding the lateral movement of slurry in the foam matrix which results in variable density and in some places no impregnation at all.

Yours sincerely

Mike Symons





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Materials Testing Laboratory

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☑ Urgent ☐ For Review ☐ Please Reply ☐ Please Comment

Date: 24 April 2008

Dear Mike,

We have inspected the two cement board samples you provided and believe that both are good though for different applications.

The denser board has dense cement surface layers top and bottom and a less dense core. It is believed that the denser surface layers are from the compression step after cement impregnation and that these add to the strength of the board. The dense board density is 1.33 g/cm^3.

The porous board is impregnated uniformly and it is believed that this will have good thermal and sound insulating properties. The porous board density is 0.31 g/cm^3.

Bend strength (MoR) was carried out on these samples using an Instron test machine with a 5 mm / minute crosshead speed – these results are presented in Table 1.

Table 1: Bend Strength Results

TYPE	MoR (MPa)	(N, sd)
DENSE	11.1	(4, 0.9)
POROUS	0.33	(3, 0.01)

The dense board strength (11.1 MPa) is comparable to Nutec fibre cement board of similar density (quoted 9.4 to 11.2 MPa), and the porous board is significantly weaker (0.33 MPa).

Please contact me if you have any questions.

Regards,

Bruce Berger

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20 August 2008

Attention: Danie Dohmen

PCT Patent Application no. PCT/ZA2003/000109
Title: Method of Producing a Hydraulic Binder or Thermoplastic Containing Product
Our Ref: Case 67
Your Ref: GC1498ZA00 DHD/nv

Dear Danie,

I refer to your letter of the 18th August 2008.

I enclose a graphic of the test we have done by the method of Kurz, which we actually did before we invented an appropriate method (the current invention), because it didn't work, for the reasons stated on the graphic page. We also enclose the machine we then built that conforms exactly to the claims in our case.

Please let me know if this is satisfactory or whether you require something further.

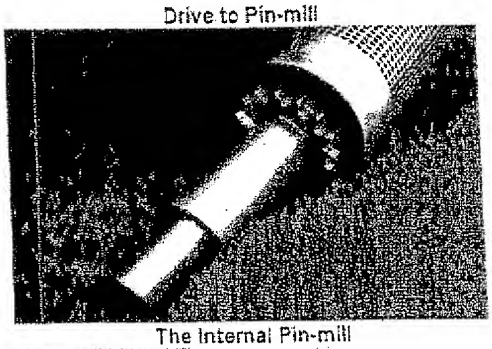
Regards

Mike Symons

POLYURETHANE FOAM INJECTOR

Built and used exactly in accordance with the method of the Invention.

Drive to Pin-mill



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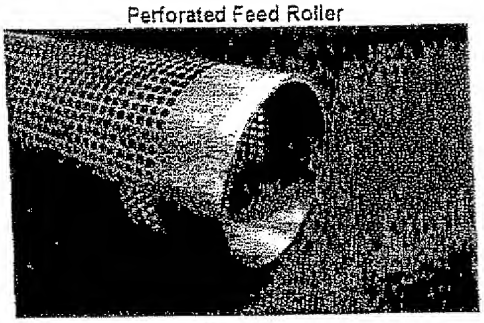

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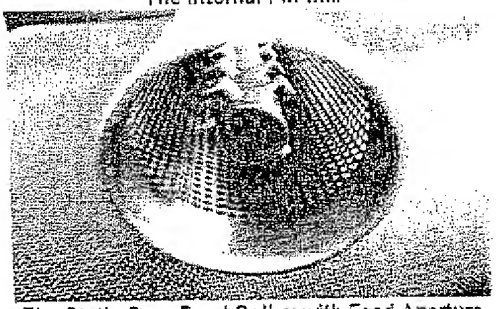

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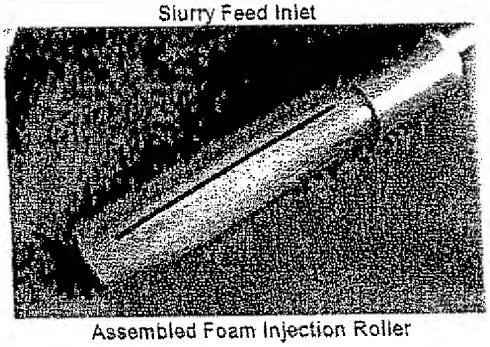
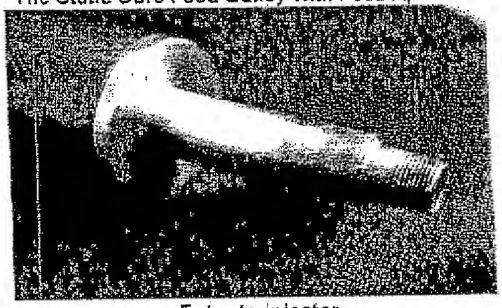
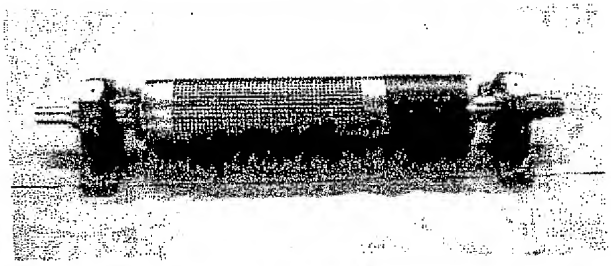


The Static Core Feed Galley with Feed Aperture



Assembled Foam Injection Roller



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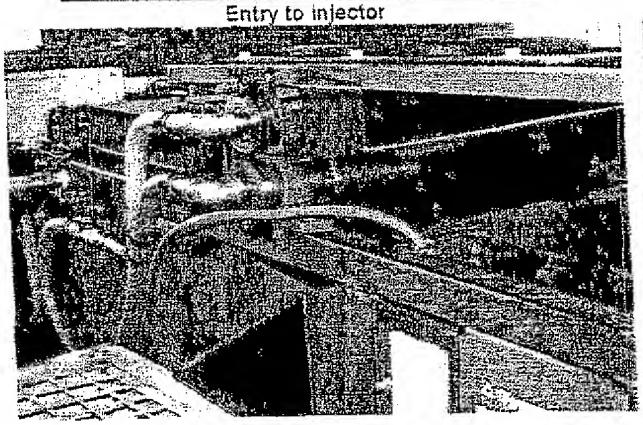
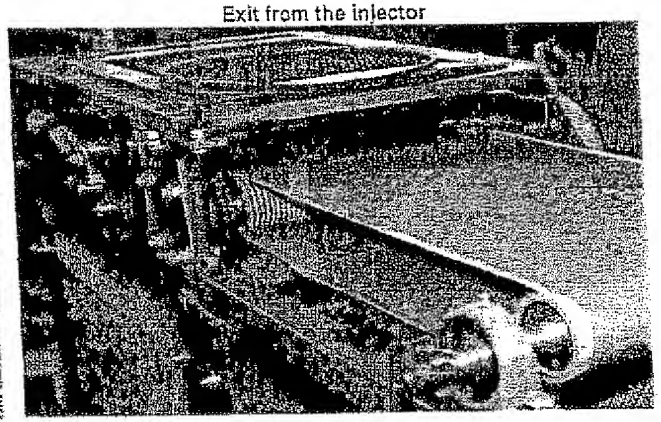


Exit from the injector

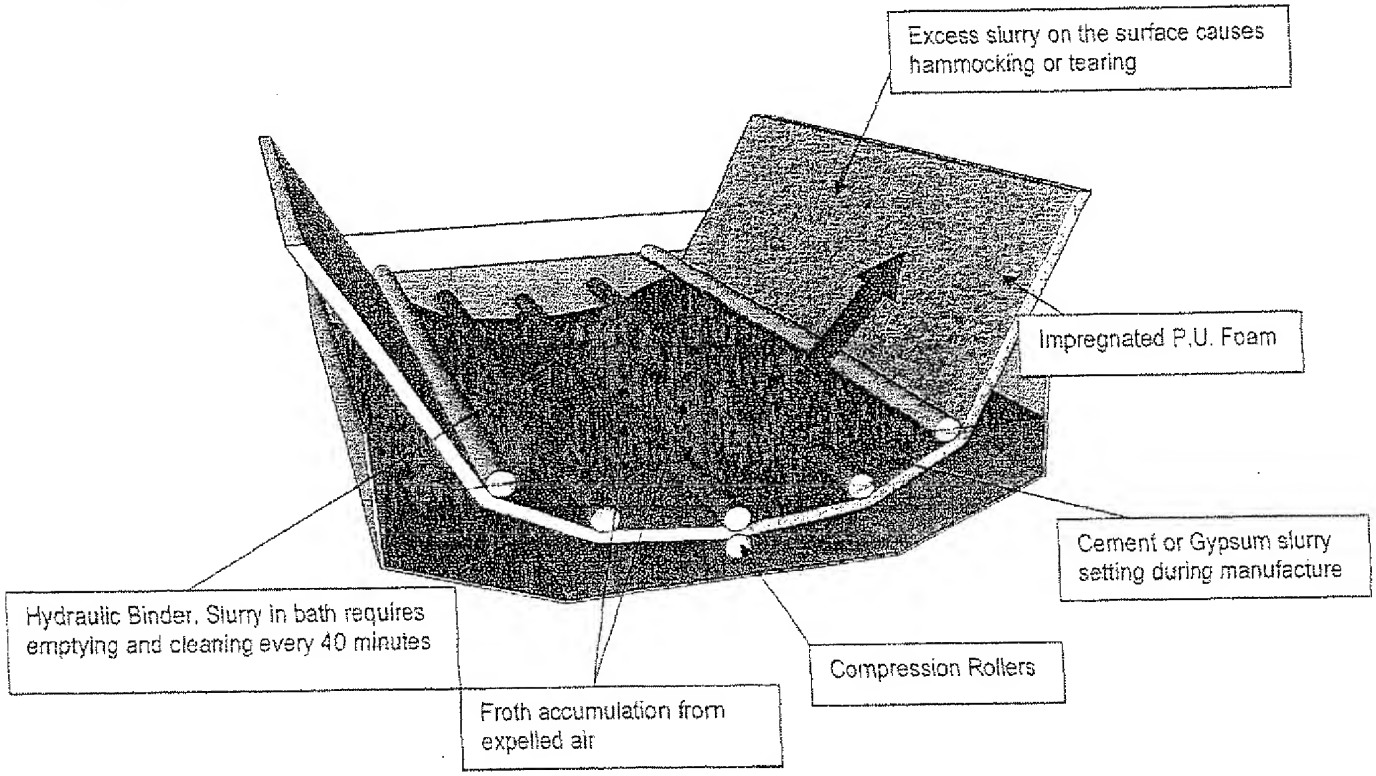


Assembled operative P.U FOAM injector as per the invention. Note the two pipes conveying the pumped slurry into the Inject roller feed galleys.

Signed: Michael Windsor Symons

The Kurz Process -

- No mechanical or continuous feed mechanism.
- Uniformity of impregnation, control of dwell time and handling of the impregnated foam are not industrially applicable.
-



Continuous pressure impregnation, as the P.U foam exits the compression/feed rollers, is the only practical solution, not impregnation of P.U foam with an hydraulic binder slurry in a bath.

I confirm having built and tried this impregnation apparatus which was not practical or industrially applicable for the reasons stated.

Signed

Michael Windsor Symons